WHAT IS CLAIMED IS:

1. A mass spectrometer for identifying mass and velocity distributions in a continuous ion beam comprising:

a guide assembly operative to direct the continuous ion beam along a first axis;

a plurality of curved electrodes extending along an arc of a circle and traversed by the continuous ion beam to create a rotating electric field impressed upon and selectively deflecting the continuous ion beam along a second axis extending transversely to the first axis; and

a position-sensitive detector operative to detect a position and time of arrival of individual ions in the continuous ion beam, whereby the detected position of each individual ion in the continuous ion beam provides information from which the ion mass-per-charge ratio is determined.

2. The mass spectrometer of claim 1, wherein the plurality of curved electrodes coextend with one another and form a configuration selected from the group consisting of a quadrupole, hexapole and octapole configuration, the plurality of curved electrodes each having a respective inner outwardly concave surface.

3. The mass spectrometer of claim 2, further comprising a power source coupled to the dispersive system and generating a predetermined pattern of electromagnetic field applied to the curved electrodes, a plurality of amplifiers each being coupled to the power source and to a respective pair of diametrically spaced curved electrodes.

4. The mass spectrometer of claim 3, wherein each pair of diametrically spaced curved electrodes define a respective plane extending substantially perpendicular to the rest of planes.

5. The mass spectrometer of claim 1, wherein the position-sensitive detector has an circular cross-section and is selected from the group consisting of a discrete anode, resistive anode, time-delay anode and a coded anode.

6. The mass spectrometer of claim 1, wherein the position-sensitive detector is spaced from the curved electrodes at a distance, which is greater than a length of the dispersal system, whereas a time during which the continuous ion beam traverses a dispersing region defined between the curved electrodes is shorter than a time during which the continuous ion beam traverses the distance between the dispersal system and the position-sensitive detector.

7. The mass spectrometer of claim 6, wherein the position-sensitive detector is a two-dimensional detector.

8. The mass spectrometer of claim 1, further comprising an ionization source located upstream from the guide assembly and selected from the group consisting of hot cathode electron impact, MEMS (micro-machined silicon) electron impact, and surface impact ionization.

9. The mass spectrometer of claim 1, further comprising a reflectron spaced axially between the plurality of curved electrodes and the position-sensitive detector and operative to reverse an axial direction of the continuous ion beam towards the position-sensitive detector.

10. The mass spectrometer of claim 9, wherein the position-sensitive detector is concentric with and surrounds the plurality of curved electrodes.

11. A method for determining an ion mass-per-charge ratio comprises the steps of:

(a) directing a ion beam along an axis extending in an initial direction;

(b) electromagnetically deflecting the ion beam from the axis along a second axis transverse to the first axis while dispersing the ion beam; and

(c) detecting with a circular position-sensitive detector intercepting the ion beam characteristics of individual ions of the ion beam.

12. The method of claim 11, wherein the step (b) includes providing a plurality of curved electrodes extending along an arc of a circle to define a dispersing region therebetween and selectively applying a dispersing voltage at a desired frequency to the plurality of curved electrodes.

13. The method of claim 12, wherein the step (a) includes directing a neutral gas flow transversely to the first axis, ionizing particles contained in the neutral gas flow by an ionization source located upstream from the plurality of curved electrodes, collimating the ionized particles forming the beam while applying an acceleration voltage to a grid positioned between the ionization source and the plurality of curved electrodes.

14. The method of claim 13, further comprising the step of tuning the acceleration voltage and the desired frequency of the dispersion voltage.

15. The method of claim 13, further comprising the step of pulsing the acceleration voltage applied to the grid in phase with the dispersing voltage, thereby allowing the ionized particles to selectively enter the dispersing region.

16. The method of claim 12, further comprising the step of reflecting the ion beam prior to detecting the characteristics of the ions by the position-sensitive detector along a reverse path extending in a direction opposite to the initial direction and spaced laterally from the first axis to avoid impinging upon the plurality of dispersing electrodes.

17. The method of claim 16, wherein the position sensitive detector is provided along the reverse path and surrounds the plurality of curved electrodes.

18. The method of claim 11, wherein the position-sensitive detector determines a position and time of arrival of the individual ions in the ion beam to provide information from which the ion mass-per-charge ration is determined.

19. A mass spectrometer for identifying mass and velocity distributions in a continuous ion beam comprising:

a guide assembly operative to direct the continuous ion beam along a first axis;

a dispersive system traversed by the continuous ion beam and operative to create a rotating electric field impressed upon and selectively deflecting the continuous ion beam along a second axis extending transversely to the first axis; and,

a circular position-sensitive detector operative to detect a position and time of arrival of individual ions in the continuous ion beam, whereby the detected position of each individual ion in the continuous ion beam provides information from which the ion mass-per-charge ratio is determined.

20. A mass spectrometer for identifying mass and velocity distributions in a continuous ion beam comprising:

a guide assembly operative to direct the continuous ion beam along a first axis;

a plurality of curved electrodes extending along an arc of a circle and traversed by the continuous ion beam to create a rotating electric field impressed upon and selectively deflecting the continuous ion beam along a second axis extending transversely to the first axis;

a circular position-sensitive detector operative to detect a position and time of arrival of individual ions in the continuous ion beam, whereby the detected position of each individual ion in the continuous ion beam provides information from which the ion mass-per-charge ratio is determined; and,

a reflectron spaced axially between the plurality of curved electrodes and the position-sensitive detector and operative to reverse an axial direction of the continuous ion beam towards the circular position-sensitive detector configured to surround the plurality of curved electrodes.